Space Weather Technical Forecast

Issued on Wednesday, 24 August 2022 at 01:19 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Active fluence likely persisting throughout. Slight chance of R1 Radio Blackout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low, with occasional C-class flares. There are three sunspot regions on the visible disc. The largest and most complex region is AR3085, now classified as Dai/Beta. This region has simplified magnetically. Another region worth of note is developing in the southeast quadrant, AR3086, currently classified as Dao/Beta. This region has developed fairly quickly, with proliferation of spots. The other region, AR3087 is a unipolar spot recently rotated around the east limb. No Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind, as measured by DSCOVR at L1, slowly declined through the period from 540 km/s to 420 km/s, as the influence of any recent weak coronal hole or transient enhancement decayed. The density was mostly average or below average. The total magnetic field strength (IMF) Bt, was generally weak, at or below 6nT, with only negligible fluctuations from the north-south component. The phi angle was negative (towards the Sun). Geomagnetic activity was Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV), as measured by GOES-16, was at Background levels. The high energy electron flux (greater than 2 MeV) remained at High levels, with a peak of 4360 pfu at 23/1455 UTC. The 24-hour integrated electron fluence remained above the Active threshold (1e8 integrated pfu) throughout the period, displaying a slight rising trend. A value of 2.64e8 integrated pfu was observed at 24/0001 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to remain Low, with only a slight chance of increasing to Moderate. AR3085 or AR3086 is the most likely source for this activity.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs feature in this forecast. Solar winds are expected to slowly decline towards background levels with geomagnetic activity remaining largely Quiet. A slight enhancement is possible at the end of day 3 (26th) or during day 4 (27th) under the influence of a small coronal hole but its impact on geomagnetic activity should be minor, with perhaps an Unsettled or Active interval.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) is forecast to remain at Background levels. The high energy electron flux (greater than 2 MeV) is currently at High levels and, in the absence of any CME arrival, is expected to persist largely at this level, only gradually declining later in the period. Consequently the associated 24 hour fluence is expected to remain at Active levels throughout, perhaps with a declining trend later in the period.

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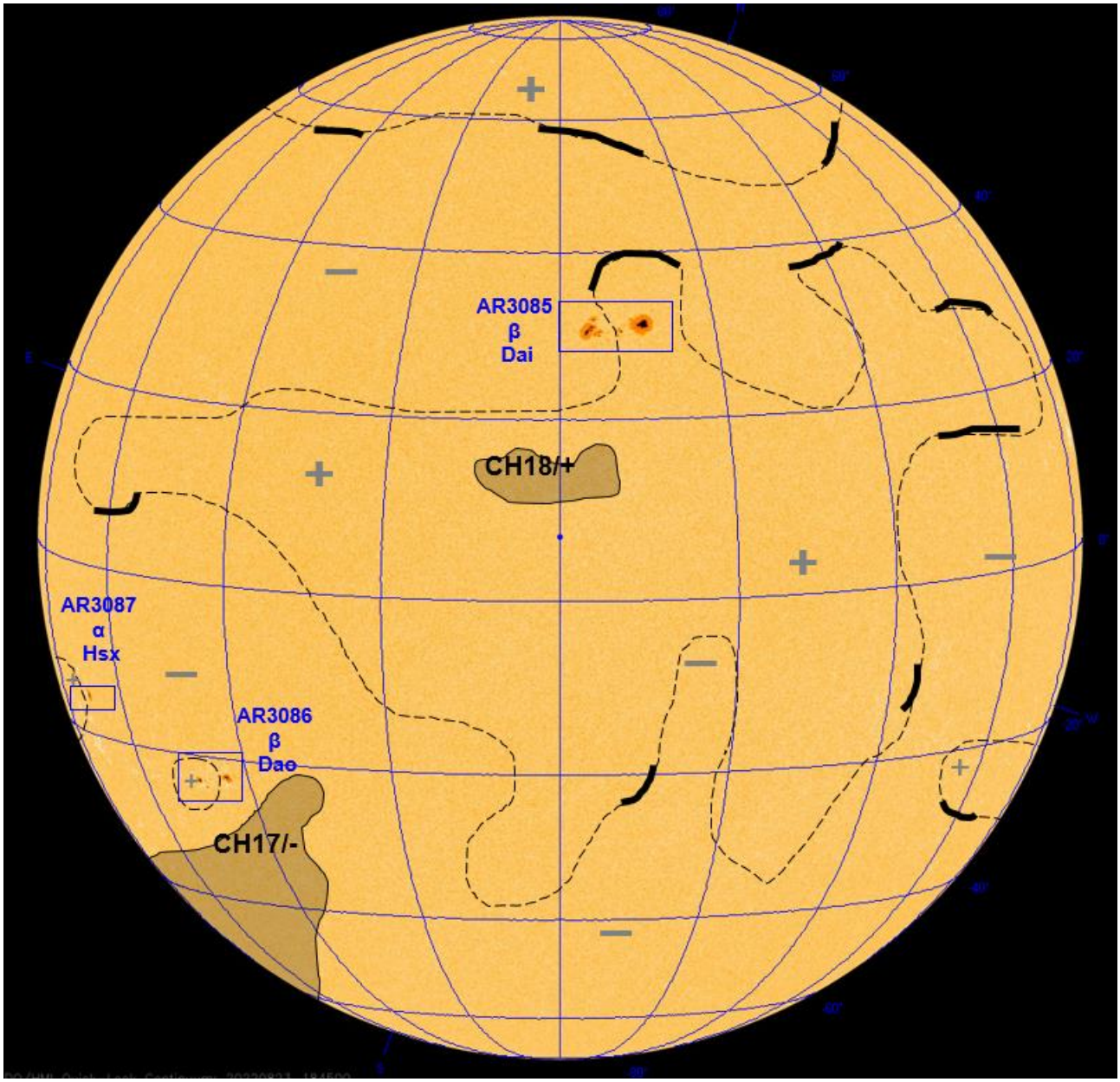
Figure 1. Solar Analysis Valid 23/1900 UTC.



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Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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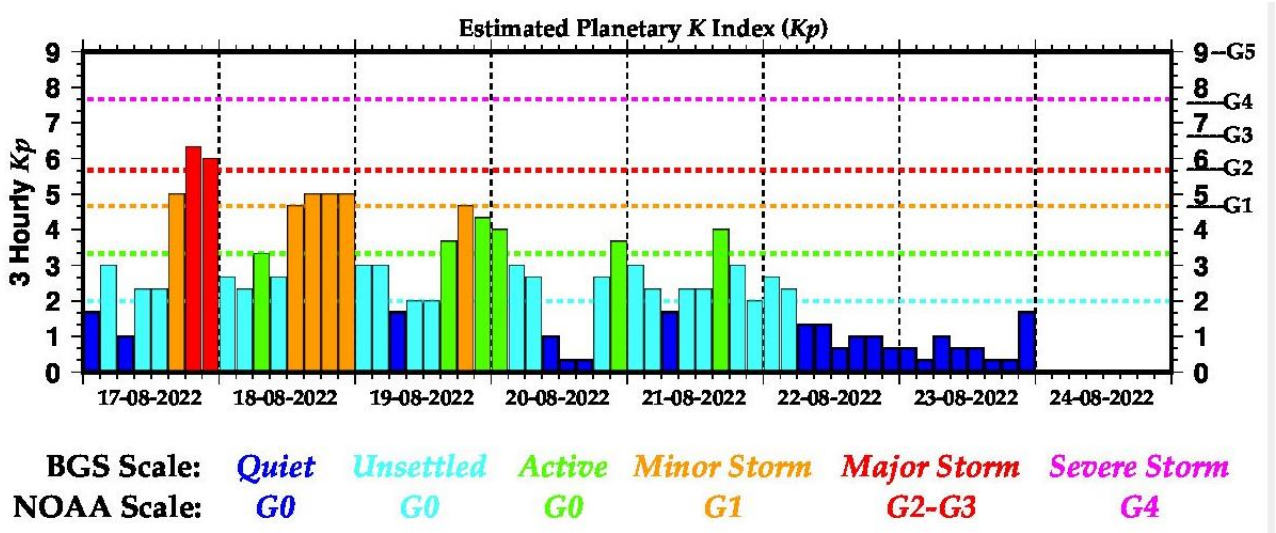
Geomagnetic Storms:

No Earth-directed CMEs feature in this forecast.
Solar winds are expected to slowly decline towards background levels with geomagnetic activity remaining largely Quiet. The MOSWOC Enlil indicates the arrival of a coronal hole high speed stream but this is not corroborated by L1 observed data and is considered to be an over-estimation of solar winds. A small coronal hole recently developed in a broad area of weak mixed fields but its current location would suggest a possible enhancement at the end of day 3 (26th) or day 4 (27th), perhaps leading to an Unsettled or Active interval.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections

Figure 2: BGS Estimated Planetary K index (Kp)



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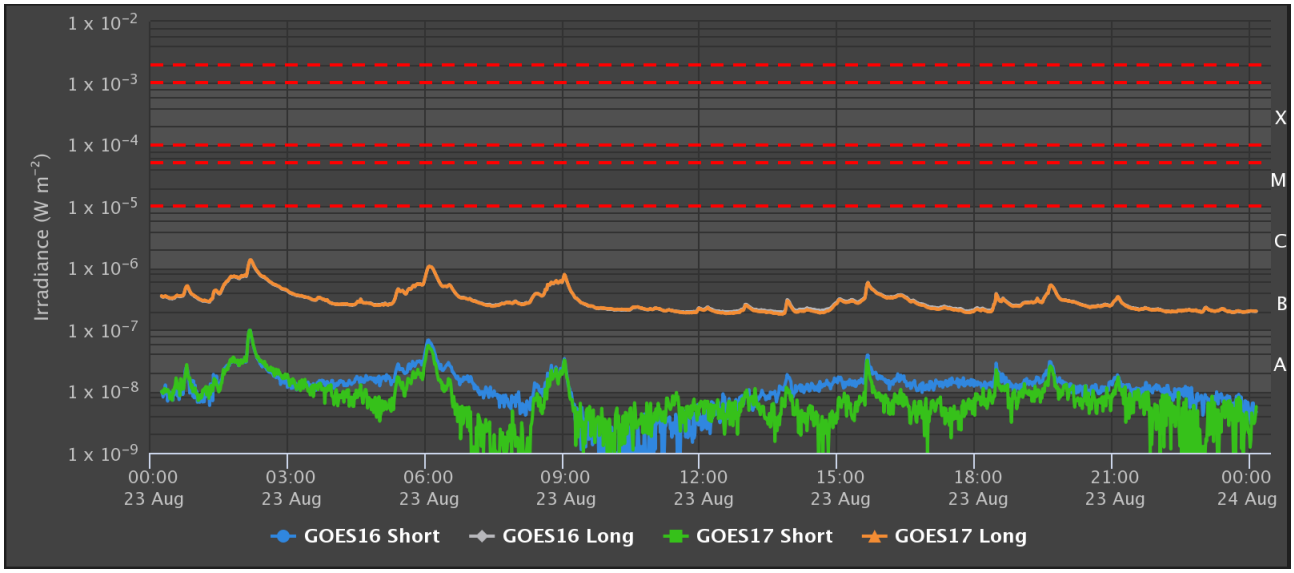
Radio Blackouts - X-Ray Flares:
There are three sunspot regions on the visible disc. The largest and most complex region is AR3085, has simplified to a Dai/Beta. Another region worth of note, AR3086, is developing in the southeast quadrant, currently classified as Dao/Beta. This region is growing in size, with proliferation of spots. The other region, AR3087, is a simple unipolar spot on the east limb.

Low activity is expected to continue due to AR3085 and 3086, with a slight chance of increasing to Moderate due to any M-flares that may occur.
Bright flux regions are visible on EUVI/AIA 195 imagery, indicating the presence of one or two potential active regions. These are expected to rotate soon on to the visible disc, perhaps boosting the flare probabilities.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	15	15	15	15
Very Active	R3 to R5 X Class	No	1	1	1	1

Figure 3: GOES16 X-Ray flares show only two weak C-class flares



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Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) as measured by GOES-16 is at background, and is expected to remain at this level.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	1	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

High Energy Electrons Event (≥ 2MeV):

The high energy (greater than 2 MeV) electron flux as measured by GOES-16 is currently high after recent coronal hole and CME enhancements to the solar wind environment. With no further CME arrivals expected only a gradual reduction in peak values is likely as the solar wind speed eases over the coming days.

The associated fluence is expected to remain Active throughout, as supported by REFM. This is likely giving good guidance.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	Yes	100	80	70	60
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	1	1

Figure 4: GOES16 ElectronFlux has been above the 1000 pfu High threshold for over 36 hours.

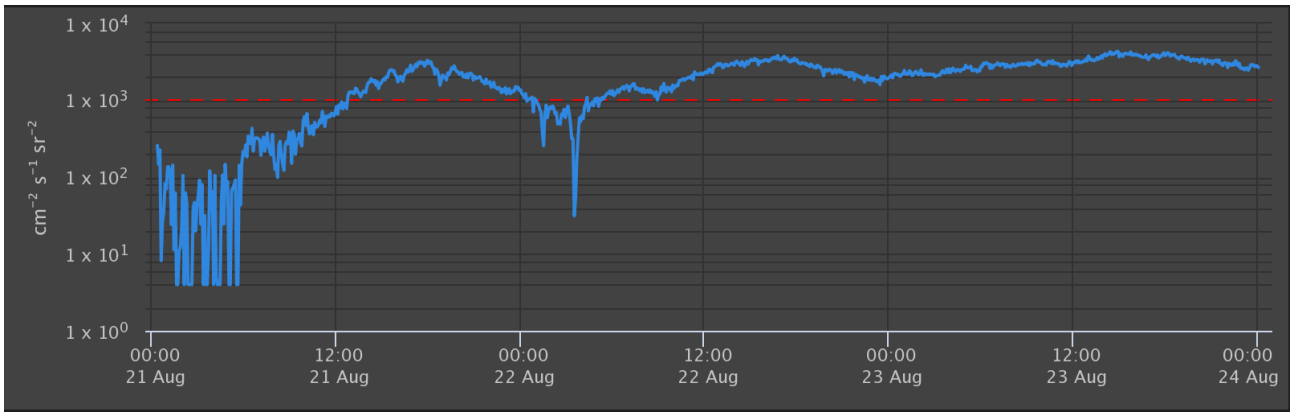

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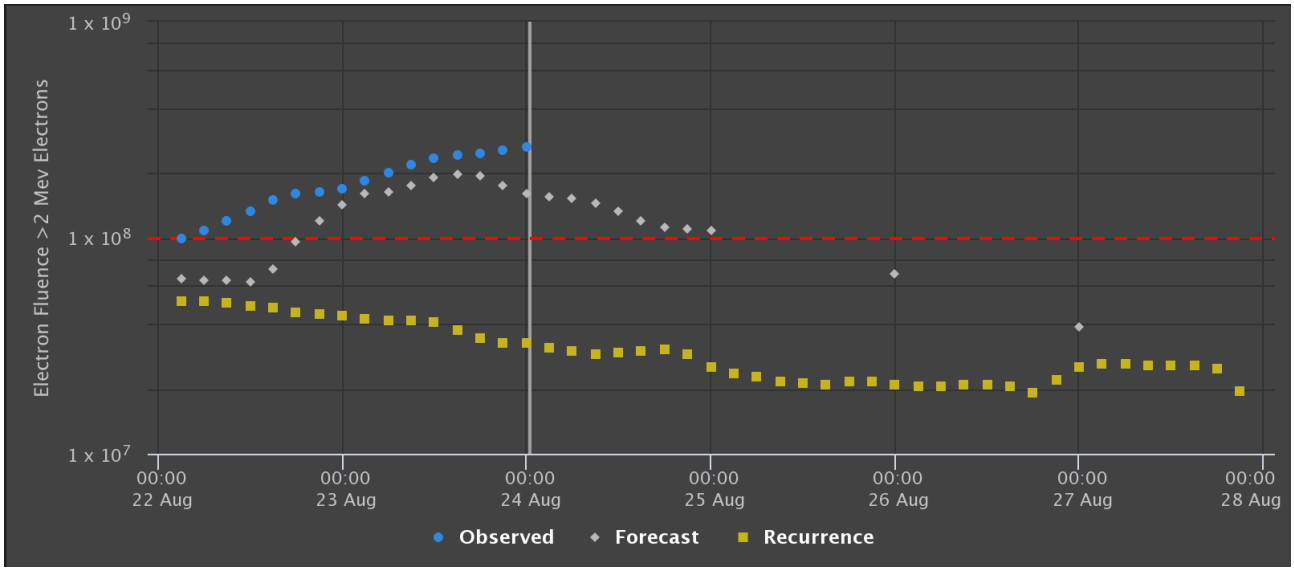
Figure 5: MOSWOC REFM shows fluence levels above the 1e8 integrated pfu Active level



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